Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Parts 1, 21, and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions	)	MM Docket No. 97-217

COMMENTS OF MOTOROLA

On June 12, 1998, the Federal Communications Commission issued a *Public Notice*[1] soliciting comment on certain *ex parte* presentations submitted in the above-captioned proceeding that intends to expand two-way communications options in the Multipoint Distribution Service (MDS) and the Instructional Television Fixed Service (ITFS).[2] Motorola, a world leader in the design and implementation of wireless systems, hereby submits these comments in response to the FCC's request.

I. Introduction and Statement of Interest.

Motorola is well known as a leading manufacturer of wireless communications products and components for the myriad of telecommunications services being offered in today's information age. Currently, Motorola is offering equipment to the MDS and ITFS services principally in the form of cable modems and routers.

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[1] *Public Notice*, DA 98-1119.

[2] *In the Matter of Amendment of Parts 1, 21, and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions*, MM Docket No. 97-217, *Notice of Proposed Rule Making*, released October 10, 1997, [*hereinafter Notice*].

The instant proceeding offers an excellent opportunity to begin to transform these 2.5 GHz fixed video operations into more competitive and efficient distributors of advanced digital services including wireless Internet access. Motorola therefore urges the FCC to adopt expeditiously a rational regulatory structure that balances the benefits of advanced two-way services with ensuring adequate interference protection to other affected licensees. While the development of two-way networks will best be achieved through the cooperative efforts of affected MDS and ITFS parties, the proposed procedures for determining potential interference to other affected parties are adequately conservative to allow a variety of two-way operations as they initially develop under various market scenarios. The FCC can always revisit these procedures once real world experience is obtained to support greater deployment flexibility and to validate interference protection assumptions.

II. Background of Proceeding.

Since the early 1980's, commercial and educational interests have shared nearly 200 MHz of spectrum in the 2.1 GHz and 2.5 GHz bands for video programming distribution, albeit with different intentions. Commercial MDS operators have focused on the provision of "*wireless cable,*" offering multichannel video entertainment programming directly to subscribers, while ITFS licensees use their allocation for the distribution of non-commercial educational programming to schools and universities.[3] Although spectrum is available for limited return path communications,[4] both MDS and ITFS operations have traditionally offered only one-way video broadcast programming.

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[3] Wireless cable operators endeavor to use as many of the 13 commercial MDS channels and 20 educational ITFS channels as they can acquire to offer a competitive commercial video service. Access to the ITFS channels is structured through leasing agreements of excess ITFS capacity.

[4] *See* Section 74.939(d) of the Commission's Rules.

Driven by the development of advanced communications capabilities for other video services such as wired cable, direct broadcast satellite and local multipoint distribution service, a number of MDS and ITFS parties petitioned the FCC to initiate this proceeding so as to expand their own ability to provide two-way services.[5] The parties, known collectively as *The Petitioners*, appropriately recognized that MDS licensees must remain technically and commercially competitive to other providers of multichannel multimedia services and, further, that wireless two-way networks using ITFS frequencies offer an outstanding opportunity to improve Internet connectivity to schools and classrooms.

In response, the FCC subsequently released its *Notice* agreeing with the policies advanced by *The Petitioners* and further noted that the proposals to distribute two-way services through cellular-like networks would promote more efficient use of the spectrum.[6] Thus, the Commission proposed to allow the deployment of two-way response stations, signal boosters and response station hubs in both the ITFS and MDS services, provided that the predicted level of interference to affected licensees fell below proposed limits.[7]

For the most part, both ITFS and MDS parties recognize and support the substantial benefits that two-way operations can offer their respective services. There are some disagreements between the commercial and educational interests on deployment, licensing and interference analysis issues. To that end, the FCC received a number of *ex parte* presentations addressing the pending proposals for authorizing two-way operations. The FCC is now seeking comments on these presentations.

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[5] *See Public Notice* RM 9060, DA 97-637 (rel. March 31, 1997).

[6] *Notice* at ¶2.

[7] *Notice* at ¶11 *et seq.*

III. The FCC Should Act Quickly to Adopt Its Proposals To Promote the Development of Advanced Two-Way Services.

Support for Two-Way: In reviewing the numerous *ex parte* presentations submitted in this proceeding, it is clear that there is not any fundamental opposition to the introduction of two-way services. Rather, most commenting parties are firm in their support. Community Telecommunications Network, for example, urges the Commission to "move on TWO-WAY" while reminding the Commission to preserve opportunities for ITFS parties to use two-way cellular-like architectures.[8] Likewise, the Diocese of Rockville Centre ("the Diocese") states that the "public interest lies in the adoption of rules that afford ITFS and MMDS licensees, as well as system operators, the ability to receive FCC approval for two-way systems on a prompt and flexible basis."[9] The Diocese goes on to state that a two-way application process "that errs too far on the side of cautious and conservative interference criteria" may result in barriers that may make it impractical to deploy two-way systems.[10]

Similarly, the numerous presentations of the Catholic Television Network (CTN) do not argue against the deployment of two-way systems. Rather, CTN indicates that its participation in this proceeding is intended to "make implementation of two-way systems more beneficial to the ITFS community."[11]

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[8] *Letter to Magalie Roman Salas from Jeffrey Olson and Aseel M. Rabie,* MM Docket No. 97-217, May 22, 1998.

[9] *Letter to Magalie Roman Salas from the Diocese of Rockville Centre,* MM Docket No. 97-217, June 5, 1998.

[10] *Id.*

[11] *See, e.g., Letter to Ms. Magalie Roman Salas from William D. Wallace,* MM Docket No. 97-217, May 27, 1998.

Motorola agrees with these and other interested parties because the development of advanced two-way data services is a logical evolution in the use of the 2.5 GHz spectrum. While recognizing the value of the programming services now occupying the band, Motorola believes that there is a greater need for broadband two-way data and imaging operations primarily to support wireless Internet access. In our view, two-way cellularized deployment of infrastructures can help achieve this goal without upsetting the FCC's original intent to promote education in this band. Indeed, these two-way operations can serve as a critical component to helping achieve the Federal Government's goal of providing Internet connections to each classroom.[12] Based on the supporting record developed in this proceeding, Motorola strongly encourages the FCC to implement quickly its proposals for two-way MDS/ITFS operations.

Interference issues: While ITFS interests provide overall support for two-way services, they express genuine concern that such operations will result in harmful interference to their receive sites. CTN has been the most active participant on this matter arguing that the proposed application process would virtually eliminate the benefits of pre-grant interference analysis and instead would rely on post hoc remedies.[13] To address these problems, CTN recommends that the FCC: 1) adopt a 6 MHz guardband between commercial upstream and ITFS downstream transmissions, 2) require notification to the ITFS licensee of the deployment of two-way response transmitters, and 3) condition initial licenses on interference free operations.[14]

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[12] For this reason, Motorola strongly supports the concept of allowing non-video applications, such as Internet access, to satisfy the educational content requirements of ITFS channels.

[13] *See* note 11 *infra*.

[14] *Id.*

Given the constraints and technical complexities associated with this band, Motorola believes that *The Petitioners* and the FCC have done well to advance the proposal of allowing two-way services into the 2.5 GHz bands while offering adequate interference protection to one-way broadcast stations. Motorola believes that most of the interference concerns will be addressed through the cooperative efforts of MDS and ITFS users that integrate two-way services into a common network. In many areas of the country, Motorola understands that MDS and ITFS licensees have achieved a near symbiotic relationship where the ITFS transmission facilities are operated and maintained by the MDS user and co-located with its own transmission facilities. Assuming that such relationships will evolve and continue into the two-way world, coordination between commercial and educational interests can be expected to resolve interference concerns.

Furthermore, since most ITFS frequencies will continue to be shared for at least the near-term future by both ITFS and MDS licensees for video programming, the ITFS and MDS video receivers are often located in the same geographic area. Thus, any interference generated by a two-way service would likely affect both operations. In such cases, it would be in the self-interest of the two-way operator to prevent such interference even without heavy-handed regulation.

While Motorola expects that many ITFS and MDS operators will discover "win-win" solutions in coordinated two-way deployment, we recognize that other two-way operators will seek to deploy two-way services in the same areas as high powered, one-way video operations. Motorola has reviewed the proposed interference analysis and believes that, overall, it is a sensible and conservative approach for predicting the level of interference to video receivers. The proposed propagation model's equations are fairly standard in the microwave industry. However, since many of the propagation paths will not necessarily be line-of-sight, the overall model's accuracy will be a function not only of the terrain data, but also be a function of the available building data incorporated therein for

a given area. Foliage loss may also need to be included. Lacking these data points, the model will tend to over-estimate the interference power at the video receiver. In other words, if a proposed deployment passes the interference criteria with only the terrain data, that will be a conservative estimate of the propagation. In the absence of any recognized standard method for aggregating interfering energy from multiple operating subscriber transmissions, the proposed approach appears to be a reasonable attempt to quantify the potential interference.[15]

Therefore, Motorola supports the adoption of the procedures proposed by *The Petitioners* as a conservative approach that will permit immediate deployments of two-way systems. Motorola is hopeful, however, that with further familiarity and greater real-world experience in the deployment of two-way systems, additional flexibility can be incorporated into the procedures in order to reduce the pre-approval burdens on system operators.

Deployment and Licensing Issues: It is Motorola's firm belief that the ultimate and most efficient use of this spectrum requires the implementation of a) digital transmission formats, b) frequency reuse in a cellular-like service, and c) uniform spectrum utilization that fosters equipment commonality.[16] The most advantageous deployment scenario of these networks will involve the direct cooperation and integration of both MDS and ITFS systems and transmissions. This will result not only in greater control of interference, it will also expand the throughput and efficient use of the entire 196 MHz of available spectrum. These networks can then provide broadband applications, including video and two-way data services, directly to thousands of MDS subscribers and ITFS end users.

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[15] Also, there are two-way multiplexing options that would have only a single subscriber active at a time in a cell. Such protocols would greatly simplify the interference analysis under the proposed rules.

The Petitioners and CTN both note that it may prove advisable to isolate in frequency two-way data services and one-way video operations. To this end, *The Petitioners* even recommend that the FCC adopt mandatory relocation procedures to enhance the ability of licensees to segregate one-way and two-way transmitters.[17]

Motorola agrees that there are deployment scenarios, especially during the initial phases of two-way deployment, where it is necessary to isolate one-way and two-way systems. It is Motorola's preference, however, that any necessary ITFS channel relocations be the result of cooperative business discussions rather than regulation. Motorola sees incentives and opportunity for relocations to occur without FCC mandates. Indeed, the forthcoming conversion of both MDS and ITFS analog video equipment to digital will provide additional capacity via compression techniques that will result in greater flexibility for reengineering.[18] Because channel swapping is already an accepted practice within the industry, Motorola would prefer not to mandate its use here. However, Motorola would strongly recommend that the FCC revisit this issue if real world deployments are frustrated by the lack of channel movements such that the ultimate goal cannot be achieved in a timely fashion.

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[16] These trends have been implemented within most other wireless services such as 800 MHz cellular and SMR services, narrowband and broadband PCS, and the newly implemented LMDS service.

[17] Proposed Section 74.902(k), *Letter to Ms. Magalie Roman Salas from Paul J. Sinderbrand,* MM Docket No. 97-217, May 15, 1998.

[18] In this regard, Motorola believes that minimum ITFS programming requirements should not be increased as a result of the conversion to digital facilities and the use of compression techniques. To do so would reduce incentives for MDS operators to upgrade voluntarily ITFS facilities to create additional capacity for two-way operations. Simply maintaining the original programming requirements would preserve the FCC's original intent in promoting educational interests on ITFS channels. While Motorola strongly supports educational uses of the spectrum, it is opposed to policies that focus more on providing educational institutions with a revenue stream as opposed to promoting the educational programming.

Motorola reminds the FCC that providers of two-way digital networks must be able to respond quickly to changing requests for service through the rapid deployment of new cell sites. If two-way providers are hamstrung with processes that delay construction of response station hubs for months or even years, they will stand no chance in the competitive marketplace of Internet delivery and other multimedia services.

Technical Flexibility: The implementation of two-way services in a band typically supporting one-way broadcast operations will create challenges in real world deployment. At this nascent stage of technical development, Motorola urges the FCC to adopt flexible technical standards for two-way networks and not restrict the permissible modulation types, duplexing method, or proportion of upstream channels.

The *ex parte* comments of Clarity Wireless, Inc. (Clarity) urge the FCC to ensure that the rules allow for the use of Orthogonal Frequency Division Multiplexing (OFDM).[19] Clarity's comments describe the benefits to licensees that can be derived from this advanced digital modulation scheme and indicates that the "results of testing show the OFDM signal will comply with the *Digital Declaratory Ruling* regarding the use of digital modulation."[20]

Motorola supports the comments of Clarity and urges the FCC to make clear that OFDM is a permissible digital modulation technique. Further, Motorola urges the FCC to ensure that it adopts policies and procedures that allow for rapid approval of other digital modulation techniques that may be developed and deployed in these services.[21] Other wireless services such as broadband and narrowband PCS, wide area SMR, and the

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[19] *Ex Parte Comments of Clarity Wireless, Inc.*, MM Docket No. 97-217, June 1, 1998.

[20] *Id.* at 9.

[21] In light of the fact that digital modulation techniques can have a significant peak to average power ratio, Motorola recommends that power related measurements should be based on rms techniques averaged over a 6 MHz channel (or scaled appropriately for sub or super channels). Furthermore, many digital modulation techniques do not provide a uniform power spectrum density over a channel and Motorola recommends that the FCC rules and power measurement procedures should not assume or require that they do so.

cellular radio services allow *any* digital modulation by rule provided that the appropriate energy levels are maintained within the authorized channel.[22] Motorola recognizes that the FCC is seeking to provide consistent protection to incumbent analog television signals when reviewing alternative digital modulations and, thus, we do not oppose the general policies expressed in the Digital Declaratory Ruling. However, the FCC should not inadvertently and unnecessarily block the introduction of new technologies.

Finally, in recent *ex parte* statements, *The Petitioners* provided certain proposed editorial revisions to the proposed rule changes contained in the FCC's *Notice*.[23] Among the changes were revised definitions for MDS Response Station Hub and MDS Signal Booster Station that make clear that these two different types of transmitting facilities may be collocated.[24] The co-location of response station hubs and signal booster stations, which can originate transmissions, facilitates the cellularization of the 2.5 GHz bands and, in Motorola's view, is an essential component of two-way offerings. Thus, we encourage the FCC to adopt these definitions as amended.

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[22] Indeed, these services allow far greater technical flexibility than the MDS or ITFS services. As an extreme example, the FCC has not specified Broadband PCS base and mobile transmit frequencies nor regulated how frequency division and time division duplex operations can coexist. The FCC has instead left those decisions to PCS licensees.

[23] *See, e.g., Letter to Ms. Magalie Roman Salas from Paul J. Sinderbrand,* MM Docket No. 97-217, May 22, 1998.

[24] *Id.* at C-2.

IV. Conclusion

The development of two-way networks in the 2.5 GHz bands offers significant improvements in spectrum efficiency and would enhance the ability of licensees to offer the public innovative and competitive services. Therefore, Motorola urges the Commission to adopt the fundamental framework as proposed by The Petitioners so that the deployment of two-way services can commence in an expeditious manner.

Respectfully Submitted,

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